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A Tentative Comparison of Free World and Bloc  
Electronics Industries, 1960-1970

A. Production Growth

Tentative estimates suggest that combined output of electronics by major Free World producers during the decade 1960-1970 probably will increase at an average annual rate of from 10 to 12 percent. Growth of electronics production in the Sino-Soviet Bloc during the corresponding period is projected at an average annual rate of from 14 to 16 percent. Should these rates prevail, Bloc electronics output will rise from an estimated 40 percent of the Free World level in 1960 to an estimated 60 percent by 1970.

Throughout this period, the US is expected to maintain its status as the world's largest producer of electronics but the lead in output volume which it now holds over the USSR, the world's second largest producer, probably will be substantially diminished. In order to achieve such growth, however, the Soviet electronics industry will find it necessary to continue, as in the past, to operate at forced draft. Such straining of material and human resources in order to meet current production goals will tend to conflict with the simultaneous need for substantial improvements in production technology and production organization. In the US, the electronics industry probably will continue to operate at considerably less than its production potential. The components branch of the US electronics industry is currently operating at less than half its capacity and could rapidly expand production if a

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larger market for its product existed. Similarly, US producers of finished electronic equipment could quickly increase production if necessary or profitable.

With the probable exception of the UK, relative growth of electronics output by Western European producers is expected to be more rapid than that of the US but slightly less rapid than that of the East European satellite countries. In absolute magnitude, the combined electronics output of the major European NATO producers (i.e., UK, West Germany, the Netherlands, France, and Italy) is expected to continue through 1970 to exceed substantially the combined output of the major East European satellite countries (East Germany, Czechoslovakia, Hungary, and Poland).

Within both the Free World and Soviet Bloc country groupings, the most rapid growth in volume of electronics output during the period under consideration probably will be achieved by Far Eastern nations -- Japan and Communist China. Now equipped with basic plant supplied by the USSR and certain of the East European satellites, Communist China's electronics industry can count for continued rapid expansion on vast domestic requirements which are as yet so largely unsatisfied. The export-oriented electronics industry of Japan is now and will continue to be more sensitive to the changing conditions of the world market. Nevertheless, according to current estimates, Japan has been able to increase its volume of electronics output from slightly more than \$200 million in 1956 to over \$900 million by 1959. In order to assure continuing rapid growth in the future, Japan probably will shift increasingly from primary emphasis on production of components and entertainment

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equipment to greater emphasis on the production of industrial, scientific, and military electronic instrumentation.

### B. Technological Advance

The pattern of technological advance in the Bloc electronics industries during the coming decade will be shaped primarily by programs of industrial reorganization and investment which are already underway. The aim of these programs is to bring about an advanced degree of plant mechanization, automation, and specialization and to maximize the standardization of components, subassemblies, and finished equipment. In an effort to eliminate a chronic impediment to more rapid technological progress in electronics production, Bloc planners will also move to strengthen production engineering staffs and to establish closer linkages between the activities of these staffs and those of the design engineers.

As a result of these programs, and because of the importance of electronics to the further growth of military and industrial power, the general level of electronics production technology in the Bloc can be expected to rise steadily and substantially throughout the period of this estimate. Assuming the continuation of present trends, the technological status of China's electronics industry should reach at least parity with that of the European Satellites before 1970 but will continue to lag well behind the level to be achieved by the USSR. As in the past, the most significant Soviet advances will be registered first in those branches of the industry most closely linked to the production of electronic equipment for military applications, with

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technology in the consumer goods market is being well defined. To a much greater degree than in the past, however, Soviet industry as a whole will become the beneficiary of electronics research, development, and production technology aimed in the first instance at military requirements. This conclusion is based on the fact that the military sector of the electronics industry will be heavily engaged in perfecting and producing equipment for automatic control and regulation of advanced weapons systems. Many of these automation techniques developed originally for the military can and will be adapted in the USSR for the automation of industry.

Notwithstanding the inevitability of rapid pace advances in state-of-the-art during the period 1960-70, future efforts by the Communist nations to reduce the current Free World lead in electronics technology will be subject to much greater difficulties than in the past. Soviet theory and fundamental research in the field of electronics has a record of excellence, and significant contributions from this area of effort may be expected with some degree of confidence. In general, however, the USSR continues to be notably slower than the US in mastering the techniques by which theory and experimentation are translated into industrial-scale production of complex electronic equipment. Moreover, stimulated by the challenge of Sputnik I and high levels of government spending, electronics technology in the US is now advancing more rapidly than at any time since World War II.

Even without massive government spending on research, development, and hardware, the electronics industries of several other Free World

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countries are currently exhibiting great vigor in terms of technological advance. The Japanese, already possessing a highly developed components production base, a skilled engineering force, and a talent for production organization, have demonstrated increasingly in recent years that they have all the tools necessary to develop one of the world's most advanced electronics industries. In such countries as the UK, West Germany, the Netherlands, France and Italy, superiority over the Sino-Soviet Bloc will probably not be evident in over-all rate of production growth, but is more than likely in the development and manufacture of components and equipment requiring a high degree of technological sophistication.

#### C. Foreign Trade in Electronics

Exports of electronics by the US to the Bloc are not expected to achieve significant proportions within the foreseeable future. With respect to the West European countries and Japan, it is possible that some sizable export contracts with the Bloc may be concluded and implemented during the period 1960-70. It is at least debatable, however, whether such contracts with the Bloc will provide these Free World countries with a steady, large-scale market for their electronics goods. As a bloc, the Communist countries tend to pursue a policy of autarky, using foreign trade more in pursuance of political goals than in recognition of the law of comparative economic advantage. In line with this policy they will attempt, for the most part, to purchase from the West single orders of advanced electronics production machinery, which they will then utilize as prototypes for domestic manufacture, rather than continuing quantities of electronics and items. With

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support to certain classes of our firms, such as information and computing instruments, electronic controls, and electronic communications equipment, which the Bloc then desires to produce from Free World manufacturers, there is every likelihood that these also would become prototypes for subsequent production by the Bloc countries themselves.

Bloc exports of electronics to the non-Communist world in the period 1960-70 will be undertaken largely in support of political objectives while domestic demand for many types of civilian electronics goods is likely to remain unmet. These Bloc exports will be aimed, not at the sophisticated markets of North America and Western Europe, but toward the untapped, unsaturated, and underdeveloped areas of the world. Initially, the USSR and East European satellites probably will focus upon the Middle East, Central America, and South America as markets for exports of electronics while Communist China will attempt to penetrate the less developed countries of the Far East and Southeast Asia. There is some possibility that, in a later phase, electronics exports of Communist China may be observed competing not only with those of the Free World, but also those of the USSR and East European satellites in the largely untapped markets of Africa.

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Selected Statistics on Estimated Production of Electronic  
Devices for the Sino-Soviet Bloc and the Free World, 1960-65-70

Table 1

Estimated Production of Electronic Tubes, 1960-65-70

Millions of Units			
Area	1960	1965	1970
USSR	150	180-200	200-250
European Satellites	55	80-100	100-120
Communist China	60	90-110	110-130
Total Bloc	265	350-410	410-500
US	450 a/	400-450	300-350
UK	90 a/	100-110	80-90
West Germany	70 a/	80-100	60-70
France	50 a/	40-50	30-40
Japan	200	150-200	100-150
Total Free World b/ c/	870	700-910	570-700

a. As of 1955.

b. More year production data not available for other important producers such as the Netherlands and Switzerland.

c. Totals for 1965 and 1970 reflect anticipated effect of more widespread substitution of transistors and other devices for electron tubes.

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ANNEX A

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Table 2

Estimated Production of Transistors, 1960-65-70

	Millions of Units		
<u>Area</u>	<u>1960</u>	<u>1965</u>	<u>1970</u>
USSR	15-20	60-120	200-300
European Satellites	1-2	18- 24	30- 40
Communist China a/	N.A.	N.A.	N.A.
Total Bloc	<u>16-22</u>	<u>98-144</u>	<u>230-340</u>
US	82 b/	250-300	500-600
UK	20 b/	60-100	150-200
Japan	<u>35 b/</u>	<u>250-300</u>	<u>500-600</u>
Total Free World c/	<u>137</u>	<u>580-700</u>	<u>1,150-1,400</u>

- a. At least one transistor plant has been scheduled to begin large-scale operations in Communist China in 1959-60. Available data provide no basis, however, for quantitative projections. It is probable that China will be producing at least several millions of transistors per year by 1965.
- b. As of 1959.
- c. Same year production data not available for other important producers such as the Netherlands, West Germany, and Switzerland.



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ANNEX A  
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Table 3

Estimated Value of Production of Electronic  
Computers by US and USSR, 1960-65-70 a/

<u>Area</u>	<u>Millions of 1959 US Dollars</u>		
	<u>1960</u>	<u>1965</u>	<u>1970</u>
US	1,000-1,200	2,000-2,500	3,500-4,500
USSR	100- 125	300- 350	1,000-1,200

a. Including both digital and analog types.

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